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(54) **Method of initiating regeneration of a particulate filter for a direct-injection diesel engine with a common rail injection system**

(57) A method of initiating regeneration of a particulate filter (37) for a diesel engine (1) having a common rail injection system (6) permitting, at each engine cycle and in each cylinder (2) of the engine (1), a fuel injection strategy performing one or more of the following injections: a main injection (MAIN1); a first pre-injection (PILOT) preceding the main injection (MAIN1) and performed at the compression stroke; a second pre-injection (PRE) preceding the main injection (MAIN1) and following the first pre-injection (PILOT); a first post-injection (MAIN2, AFTER) following the main injection (MAIN1); and a second post-injection (POST) following the first post-injection (MAIN2, AFTER) and performed at the exhaust stroke; the second pre-injection (PRE)

and the first post-injection (MAIN2, AFTER) being performed close enough to the main injection (MAIN1) to participate, together with the main injection, in the actual fuel combustion phase. The method of initiating regeneration of the particulate filter (37) provides for implementing, at each engine cycle and in each cylinder (2) of the engine (1), a fuel injection strategy wherein one or more of the first and second pre-injection (PILOT, PRE), the main injection (MAIN1), and the first and second post-injection (MAIN2, AFTER, POST) are performed, and wherein the timing of one or more of the injections performed is varied with respect to the timing of the injections in particulate filter non-regenerating conditions.

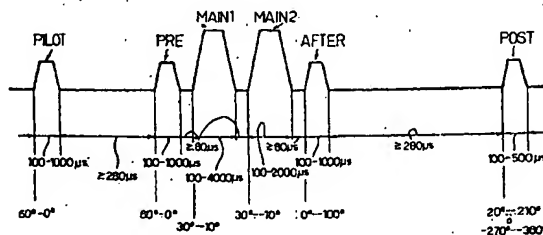


Fig.2

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EUROPEAN SEARCH REPORT

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	EP 1 026 385 A (TOYOTA MOTOR CO LTD) 9 August 2000 (2000-08-09) * paragraphs '0002!', '0006!', '0011!', '0012!' * * paragraphs '0093!'-'0096!', '0098!'-'0101!' * * paragraphs '0103!', '0104!', '0107!', '0108!' * * paragraphs '0110!'-'0114!', '0196!'-'0212!' * * claims 1-8, 14, 20, 21 * * figures 20-22, 24, 48-50 * ---	1-5, 30-34	F02D41/02 F02D41/40 F02D41/14
X	US 5 826 425 A (CANALE SILVIO ET AL) 27 October 1998 (1998-10-27) * figures * * column 1, line 8 - line 10 * * column 2, line 54 - column 3, line 62 * * column 4, line 3 - line 11 * * column 4, line 23 - line 29 * * claims 1, 7-9, 11 * ---	1-5, 24, 33, 34	
D	& WO 96 03571 A (FIAT RICERCHE) 8 February 1996 (1996-02-08) ---		
A	EP 1 035 314 A (FIAT RICERCHE) 13 September 2000 (2000-09-13) * paragraphs '0001!', '0009!', '0015!'-'0019!' * * column 3, line 30 - line 32 * * column 3, line 40 - line 42 * * column 3, line 50 - line 54 * * column 4, line 37 - line 48 * * paragraphs '0031!', '0034!' * * column 7, line 5 - line 27 * * column 7, line 37 - line 46 * -----	1-3, 8, 9, 12, 17, 18, 22-25, 27	TECHNICAL FIELDS SEARCHED (Int.Cl.7) F02D
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 11 September 2003	Examiner Lapeyronnie, P
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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 02 01 7387

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11-09-2003

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 1026385	A	09-08-2000	JP 3225957 B2	05-11-2001
			JP 2000291462 A	17-10-2000
			EP 1026385 A2	09-08-2000
			US 6276130 B1	21-08-2001
US 5826425	A	27-10-1998	IT T0940606 A1	22-01-1996
			DE 69502624 D1	25-06-1998
			DE 69502624 T2	17-12-1998
			EP 0784738 A1	23-07-1997
			ES 2116755 T3	16-07-1998
			WO 9603571 A1	08-02-1996
EP 1035314	A	13-09-2000	JP 10503254 T	24-03-1998
			IT T0990172 A1	05-09-2000
			EP 1035314 A2	13-09-2000
			JP 2000303892 A	31-10-2000
			US 6491016 B1	10-12-2002

EPO FORM P-459

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